

Plant Document Analysis

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ENGINEERING SPECIFICATION ANALYSIS

Focus Area: Weld procedure

Generated on November 18, 2025

Accepted Specifications for Evaluation of Weld procedure

- Document reference to applicable code: design and construction to comply with API 650 and "Supplement to API 650" (Sections 1.1, 7, 8) — establishes API 650 as governing standard for welding-related requirements.
- Vendor data requirement to submit "Weld procedure" (12.2 during Manufacturing & site erection, item ii) — explicit requirement for vendor to provide welding procedure documentation.
- Vendor data requirement to submit "Welder Qualifications" (9.0 heading implies welder qualification requirement; 12.2 list references welding documentation and NDE) — document requires welder qualification records as part of vendor submissions.
- Requirement that "Welding, heat treatment and non-destructive testing shall be in accordance with Project Specification" (9.5 General (New Paragraph)) — mandates that welding/PWHT/NDT follow the project specification.
- Plates greater than 20 mm used for flanges shall be ultrasonically tested (5.7.1.11: "Wherever plates are used for flanges, the plates greater than 20 mm shall be ultrasonically tested.") — NDT requirement tied to welded flange plates.
- Gasket contact faces of plate flanges shall be machined only after flange to nozzle neck welding has been completed (5.7.1.11) — procedural sequencing requirement for welds and subsequent machining.
- When shell plates with openings require post weld heat treatment, the openings shall be grouped in as few plates as possible (5.7.4.1 Addition) — PWHT-related fabrication requirement.
- Mill test reports or certificates of compliance to be furnished to Construction Manager (6.2.1 Shop Inspection) — material verification required for welded components.

- Material-related weldability control: carbon content limit and carbon equivalent formula specified for carbon/ carbon-manganese steels (4.1.8: $C \leq 0.25\%$ and $CE \leq 0.43$ with formula $CE = C + Mn/6 + (Cr+Mo+V)/5 + (Cu+Ni)/15$) — material limits relevant to welding procedures and preheat/PWHT considerations.

- Requirement that welding, heat treatment and NDE be in accordance with Project Specification (9.5) and that welding/heat treatment/NDT be per Project Specification (9.5 and other references) — repeated mandate to follow project-level welding controls.

- Vendor data requirement to submit "NDE procedure" and "Material test procedures / certificates" (12.2 items xiii and xiv) — explicit NDE and material testing documentation deliverables linked to welding quality control.

- Requirement that "Ultrasonic testing" be applied to plates greater than 20 mm where plates are used for flanges (5.7.1.11) — repeats the UT requirement specifically for flange plates.

Measurements Provided in Document

- Plate thickness threshold for mandatory ultrasonic testing of flange plates: greater than 20 mm (5.7.1.11).

- Material thickness threshold for using ASTM A537 Class 1 OR SA516 Gr70: thicknesses greater than 35 mm (4.2.5).

- Shell thickness threshold for when tanks shall be designed to API 620 (for pressure plus corrosion allowance): shells where required thickness exceeds 12.5 mm (F.7.1).

- Carbon content maximum for carbon steels: 0.25% maximum (4.1.8).

- Carbon equivalent (CE) maximum: 0.43 maximum with CE formula provided (4.1.8).

Inputs and Additional Requirements from Client

- Client-specified governing code: API 650 with Supplement to API 650; latest edition and addenda at time of order to apply (1.1) — establishes which welding-related code provisions apply.

- Vendor must submit Weld procedure and Welder Qualifications as part of vendor data (12.2 item viii and 9.0 heading) — client provided instruction to supply these documents.

- Vendor must submit NDE procedure and Material test procedures / certificates (12.2 items xiii and xiv) — client requires these inputs tied to welding acceptance.

- Vendor must provide Design Calculations and Structural & support Calculations (12.2 items vi and vii) — relevant to welded attachments/nozzles and may affect weld procedure scope.

- Vendor must provide Nozzle load Analysis (12.2 item viii in same list) — affects design/welded reinforcement around nozzles.

- Project Specification is repeatedly referenced as prescribing welding, heat treatment and NDT details (9.5). The document requires compliance with "Project Specification" for specifics, but that Project Specification content (e.g., WPS parameters, preheat/PWHT temperatures/durations, PQR requirements, acceptance criteria for NDT) is not included in this document and therefore is a missing input.

- Missing / unspecified items (explicitly implied as required but not provided in this document):

- Specific Welding Procedure Specification (WPS) parameters (process, filler metal spec, preheat and interpass temperatures, PWHT temperatures/durations, heat input limits) — not stated in the document.

- Welder qualification records (WQT/WPQ details) and acceptance ranges — not included.

- Detailed NDE acceptance criteria and extent of NDE (e.g., acceptance levels for UT/RT/VT/MPT) beyond the single UT requirement for flange plates >20 mm — not included.

- Specific Project Specification document reference or its welding clauses (the document defers to the Project Specification but does not include it).

- Any mandatory PWHT requirements (temperatures, durations) for specific materials or weld types beyond the procedural grouping statement — not provided.

- Welding filler material specifications and weld joint detail drawings (WPS requires these but are not included).

- Orientation/sequence instructions for welding other than the one machining sequencing item (gasket faces machined after flange-to-nozzle neck welding) — no further procedural sequencing supplied.

Notes / Constraints

- The above lists include only items explicitly stated in the supplied document that are relevant to "Weld procedure." No additional welding parameters, acceptance criteria, or procedural details were inferred or added. The document defers detailed welding parameters to the Project Specification and to vendor-submitted Weld Procedure and NDE Procedure, which are required deliverables but whose contents are not included in the provided document.

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